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ABSTRACT

The purpose of this study was to determine the effectiveness of an instructional program in reading and language development in the content areas of science, social studies, and mathematics in grade two. An experimental group received formally prepared lessons in reading for twenty minutes per day for five weeks each, in science, social studies, and mathematics, while the control group did not receive formally prepared lessons. The researcher concluded that formal and informal teaching were equally successful; on only three of the sixteen areas tested was there a significant difference; and emphasis on well-planned and prepared instruction, formal or informal, seems to be the key to greater learning productivity. (MK)

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A COMPARATIVE STUDY

OF

THE EFFECTIVENESS OF FORMAL AND INFORMAL TEACHING

IN SCIENCE, MATH, AND SOCIAL STUDIES

by

Sister M. Ramona Kruse

A Research Study Submitted to the Academic Dean

Winona, Minnesota

September, 1979

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CHAPTER I

INTRODUCTION

Preliminary Statement

It is a well-known fact that reading influences the total personality development of the child. Through the medium of reading, the child is able to incorporate into his personality ideas and ideals which will assist him in the art of interpreting, associating and evaluating as he participates in the thought-life of the world.

Through a systematic development of comprehensive skills parents and teachers can be instrumental in cultivating a refinement of reading tastes, interests, proficiency techniques and skills in content reading. Because reading is essential to daily living, we want children to enjoy reading, to consider the effort to learn to read and improve their skill a worthwhile task. With guidance and good teaching it should be possible to develop these attitudes and appreciations in children at a very young age.

I. THE PROBLEM

Statement of the Problem

The purpose of this experimental study is to determine the effectiveness of an instructional program in reading and language development in the content areas of science, social studies and math in grade two.

Do second graders who will receive formally prepared lessons in reading for twenty minutes per day for five weeks each, in science, social studies and math show any significantly greater gains in reading and language development than similar students without formally prepared lessons?

Gains in reading and language development will be determined by administering both before and after the treatment the following instruments:

> Peabody Picture Vocabulary Test, the Verbal Expression sub-test of the Illinois Test of Psycholinguistic Abilities, Teacher Appraisal of Child's Use of Oral Language, Test of Attitudes, Inventory-Survey Test, Science, a Modern Approach Evaluation, and Mathematics Around Us Evaluation.

Importance of the Study

When one considers the factors which influence the early development of the child, love for reading holds a unique and important place. We cannot begin too soon to give the child worthwhile books so that almost at the same time that he is able to grasp the meaning of the spoken word, he may be introduced to the best book suitable to his age. It should therefore follow that the teacher of content material always makes reading a challenging and informative experience for the child. For full appreciation, the child should not only be able to read fluently and to comprehend meaning, but he must have an interest in and a background of knowledge he is going to read and later talk about.

Teachers and parents who are aware of their role in the child's cognitive development should be convinced that reading in the content area is a powerful means for developing more meaningful, more diversified reading curiosity in the child.

Definition of Terms Used

1. Contents. Contents are the broad, substantive kinds of information as presented to or perceived by the individual.

    a. Behaviors content. Information, basically nonpictorial and nonverbal, that involves human interaction, that is, information representing attitudes, needs, desires, moods, and intentions.

    b. Figural content. Information in concrete form, that is, the actual object or a realistic picture of the object involving perception by visual, auditory, or kinesthetic sensory modalities.

    c. Semantic content. Information in the form of conceptions or mental images.

    d. Symbolic content. Information in the form of denotative signs having no basic significance in and of themselves, such as letters, numbers, musical notes, codes, and words.

2. Comprehensive Skills in Content Reading Grade 2.

    1. Interpreting phrases and sentences

        a. Understanding that a sentence is a unit of thought

        b. Answering oral and written questions based on the content reading

c. Following written directions systematically and accurately

d. Recognizing the effect of such words as: but, after, on, if, upon the rest of the sentence

e. Interpreting figurative language

2. Grasping the main idea

a. Retelling in one or two sentences a part of the content read

b. Recognizing in titles and in key words the main idea

3. Strengthening the memory effectively

a. Relating the events of content reading in sequence

b. Rearranging sentences in the correct order

c. Identifying material read from key sentences taken from the content reading

d. Formulating questions about the content reading

4. Forming associations

a. Perceiving relationships

1. Time and place

2. Cause and effect

3. Sequence

4. Analogies

a. part - whole

b. similar - opposite

c. specific - general

b. Drawing inferences

1. Grasping ideas implied but not directly stated

2. Gleaning information implied in pictures

c. Reaching conclusions

d. Anticipating outcomes

e. Forming generalizations

3. Formal teaching. Formal teaching is an organization of instruction specifying definite terms or skills to be taught at stated times and by a systematic method.

4. Informal teaching. Informal teaching refers to the teaching of certain skills only as the need for them occurs in connection with other schoolwork or with the pupils' activities or interests.

   This more informal teaching occurs in programs planned around projects, units, themes, or activities. The emphasis falls on planning the environment so that pupils can experiment, manipulate, inquire, and communicate freely in integrated learning experiences.

CHAPTER II

REVIEW OF RELATED RESEARCH

Purpose

The purpose of this chapter is to review the research studies that are related to the writer's study.

Most educational researchers would agree on at least one generalization about teaching. Formal teaching styles are more effective in teaching basic skills of reading and math than informal styles. By formal teaching, Guthrie is alluding to educational programs in which different subjects such as reading, math, social studies, and sciences are taught separately. Informal teaching, on the other hand, tends toward the integration of subject matter, allowance of the child's choice of study, and reliance on the intrinsic motivations of exploration, discovery, and self-direction.

Although many informal teachers believe formal teaching of basic skills is necessary, they also believe formal teaching methods neglect to encourage creativity, responsibility, freedom, and self-discipline within the child.

During a recent survey by Stanchfield, in a comprehensive study including children from all social levels, the effectiveness of teaching reading skills in a sequential, structured way showed significant differences in favor of formal teaching rather than informal teaching.

A study conducted by Karnes and others, compared an informal approach with a formal approach aimed at language and cognitive development. Children who received formal instruction were superior in reading and math compared with those who received informal instruction.

In contract, Prendergast compared three groups of upper middle-class children - in an informal nursery school program, a Montessori structured program, and a non-nursery school group. After seven months there were no significant differences among the groups, which seemed to indicate that children from middle-class homes developed pre-reading competencies with or without nursery school experience.

Experience tells us that the styles, beat, and purposefulness of children in classrooms can be influenced in positive ways by how the teacher presents materials and interacts with children; therefore, children differ in the types of teaching environments in which they learn best.

We also know that individual children will use a teaching-learning environment differently throughout a given day and differently from day to day.

Formal instruction versus informal instruction is not a dichotomy - we can achieve a blend in our teaching. Learning to read comprehensively is too crucial to leave to chance, especially for children of lower abilities and those from disadvantaged homes. However, formal teaching will be fruitless if it becomes so direct and prescriptive that bored and frustrated children fail to see relationships or make applications. Although teaching may be formal without rote learning, children need sufficient knowledge so as to be comfortable in informal, gamelike activities.

CHAPTER III

METHOD OF PROCEDURE

It is the purpose of this chapter to outline the method of research used in this study, to describe the Experimental and Control Groups, and to discuss the procedures used in the treatment of the data obtained.

Design of the Study

This study utilized the experimental method of research. It attempted to determine the effect on reading comprehension and language development of an instructional program in the content areas of science, social studies and math in grade two.

Selection of Subjects

Nine pairs of children were used as subjects. One subject of each pair for the Experimental Group; the other subject of each pair comprised the Control Group.

For the study nine subjects received the experimental treatment, and nine subjects served as the control group.

The Experimental Group was from a group of second grade children in a southeastern Minnesota elementary school.

The Control Group was also from a group of second grade children in a southeastern Minnesota elementary school.

Selection of Tests

Pre-testing instruments for all children were the Peabody Picture Vocabulary Test, Form A; Verbal Expression sub-test of the Illinois Test of Psycholinguistic Abilities (ITPA); Teacher Appraisal of Child's Use of Oral Languages, Test of Attitudes, Inventory-Survey Test, Science, a Modern Approach Evaluation, and Mathematics Around Us Evaluation.

Post-testing instruments included Peabody Picture Vocabulary Test, Form B; Verbal Expression sub-test of the Illinois Test of Psycholinguistic Abilities (ITPA); Teacher Appraisal of Child's Use of Oral Language, Test of Attitudes, Inventory-Survey Test, Science, a Modern Approach Evaluation, and Mathematics Around Us Evaluation.

Procedure

Data gathered on each child were: name, date of birth, sex, I Q, reading score, testing scores on the Peabody Picture Vocabulary Test, Illinois Test of Psycholinguistic Abilities (ITPA), Teacher's Appraisal of Child's Use of Oral Language, Test of Attitudes, Inventory-Survey Test, Science, a Modern Approach Evaluation, and Mathematics Around Us Evaluation.

Each child's name, date of birth, sex, I Q, and reading score was obtained by the investigator of this study from the school records.

The Peabody Picture Vocabulary Test, Illinois Test of Psycholinguistic Abilities (ITPA), Teacher's Appraisal of Child's Use of Oral Language, Test of Attitudes, Inventory-Survey Test, Science, a Modern Approach Evaluation, and Mathematics Around Us Evaluation were administered by the investigator of this study.

The writer of this study presented the lessons to the Experimental Group of nine subjects five days per week, twenty minutes a day, for a period of five weeks for each content area: science, social studies, and math.

The lessons were taught in the classroom.

Time Table

Pre-testing: August 21 - 31, 1978

Experimental period in science: September 11 - October 13, 1978

Experimental period in social studies: October 16 - November 17, 1978

Experimental period in mathematics: November 27, 1978 - January 5, 1979

Post-testing: January 8-19, 1979

Preceding and following the testing periods, three dimensions of the child's oral language in classroom situations were measured: (1) Frequency of Utterance; (2) Relevancy of Utterance; (3) Maturity of Utterance. Frequency included how often oral language was evidenced by the child in various oral language situations within the school day. Relevancy pertained to the appropriateness of the verbal contributions of the child when he did speak, regardless of the frequency of speaking. Maturity pertained to the child's ability "to expand and elaborate basic sentences"[1] in order to express exact meaning.

For the dimension of Frequency of Utterance, consideration was given to how often oral language was evidenced by the child in various

oral language situations which arose in class activities. Evaluation was based on situations in which the child was verbally interacting with several children in a group of at least five. Five categories, comprising a continuum of Frequency of Utterance, were denoted:

1. Rarely: When the opportunity was presented, the child rarely used oral language.

2. Seldom: When the opportunity was presented, the child seldom used oral language.

3. Occasionally: When the opportunity was presented, the child occasionally used oral language.

4. Frequently: When the opportunity was presented, the child frequently used oral language.

5. Always: When the opportunity was presented, the child always used oral language.

For the dimension of Relevancy of Utterance, consideration was given to the appropriateness of the verbal contributions of the child when he did speak, regardless of the frequency of speaking. The following five categories of Relevancy of Utterance were defined:

1. Irrelevant: When the child did speak, most of his oral language was not relevant to the situation or topic at hand. (Example: In a class discussion regarding plans for a holiday party, the child referred to his pet at home, some incident which occurred enroute to school, or some other unrelated event.)

2. Generally irrelevant: When the child did speak, he usually talked "all around" the topic without touching on the major factors involved. (Example: In a class discussion regarding plans for a holiday party, the child mentioned parties in general or perhaps his own birthday party, but indicated nothing regarding plans for the party at hand.)

3. Indirectly relevant: When the child did speak, he tended to get on a tangent or pursue his self-interest. (Example: In a class discussion regarding plans for a holiday party, the child discussed his own family plans rather than plans for the class party.)

4. Generally relevant: When the child did speak, he usually talked "about" the topic without getting at the important matter and decisions to be made. (Example: In a class discussion regarding plans for a holiday party, the child referred to his feelings of joy and satisfaction of having <u>this</u> party, or agreement with suggestions of others but did

not contribute specifically to the plans and decisions to be made.)

5. Relevant: When the child did speak, most of his oral language was very definitely relevant to the situation or topic at hand. (Example: In a class discussion regarding plans for a holiday party, the child discussed some aspect of actual planning, such as whom to invite, invitations, time and place, or refreshments to be made.)

For the dimension of Maturity of Utterance, consideration was given to the child's ability to utilize elaborated or expanded sentence structure to express his exact meaning when he did speak, regardless of the frequency of speaking. The following five categories of Maturity of Utterance were outlined:

1. One word: When the child did speak, most of the time he used one word utterances to represent a unit of thought. (Example: In a class discussion regarding plans for a holiday party, the child used a single word, "Cookies," to represent an extended thought such as "I want us to make cookies for our party.")

2. Phrases: When the child did speak, most of the time he used phrases rather than sentences to indicate his thinking. (Example: In a class discussion regarding plans for a holiday party, the child used a phrase, "Make cookies," to represent an extended thought such as "I want us to make cookies for our party.")

3. Simple sentences: When the child did speak, most of the time he used simple sentences, including a noun phrase and a verb phrase, to indicate his thinking. (Example: In a class discussion regarding plans for a holiday party, the child used simple sentences, such as "I want to make cookies" to represent an extended thought such as "I would like us to make some cookies for our party.")

4. Modified sentences: When the child did speak, most of the time he used simple sentences with modifiers and/or coordinated sentences with or without modifiers. A coordinated sentence is one in which two simple sentences are combined with the word "and." (Example: In a class discussion regarding plans for a holiday party, the child used sentences such as the following:
   Simple sentence with modifiers: "I want to make some cookies for our class party."
   Coordinated sentence: "I want to have a party and I want to make some cookies for it.")

Each investigator was provided with three sets of name cards, one set to be used for representing each of these three dimensions of oral

activities. The name cards were individually cut, each bearing the name of a participating child.

The cards for each dimension of oral language activity were sorted by the investigator into the five categories of involvement.

In making a judgment for each participating child, the investigator considered the child in relation to the specific category of the dimension of oral language. Investigators were reminded that the number of children in each category probably would vary. In a given class, some categories contained no children, whereas other categories included many of the children. It was suggested that the investigator assign those children about whom she felt relatively certain to the appropriate category, and assign the remaining children on the basis of their performance in relation to the children already placed in the category.[2]

Teachers considered the names of the children for only one oral language dimension at one time.

The Peabody Picture Vocabulary Test is "designed to provide an estimate of a subject's verbal intelligence through measuring his hearing vocabulary."[3] With children under eight years of age, the test involved the examiner showing the child a series of pictures of four objects on each page of the test book. The examiner said a prescribed word with reference to one of the pictures and the child was required to select the picture of the appropriate object referred to by putting his finger on the picture. Form A was used in the pre-test and form B was used in the post-test.

The Illinois Test of Psycholinguistic Abilities is a battery of tests "designed to identify psycholinguistic abilities and disabilities in children between the ages of two and one half and nine."[4] The verbal expression sub-test used measured the child's ability to express ideas in spoken words. The child was asked to describe a ball, an envelope, a button and a block. His score depended on the number of unique and meaningful ways in which he described the particular test object.[4]

The Inventory-Survey Test is designed to test comprehension and word analysis through reading. It is used with children in the primary grades.[5] The test involved the examiner working with the child in a sample question of each section: word and phrase meaning, sentence meaning, paragraph meaning, scrutiny, phoneme-grapheme relationships, inflection and derivation. The child was then required to read and answer each section silently. Form A was used in the pre-test and the post-test.

Science, a Modern Approach Evaluation was used as a pre-test in this study. To insure the validity of this test it was also used as a post-test, conducted on an individual basis.[6] The procedure was as

follows: each child was asked to bring some air from outside of the classroom into the class. The child had to be creative and figure out his own way of doing this. When the child returned to the room, the administrator of the test asked the child to share the air he brought back with her. The child had to explain how he managed to get the air into the classroom and how he brought "outside air" in and not some other kind of air. An evaluation based on the child's solution to the problem showed that he knew that air: takes up space, has no shape of its own, and has weight.

Evaluation Three of Mathematics Around Us was designed to evaluate comparison of numbers, order, sums and minuends through ten.[7] It was used as a pre-test and an alternate form was used as a post-test.

Attitudes Survey is a survey of student interests that is totally school related. It does not probe student attitudes toward self, peers, parents, or school personnel. Survey of School Attitudes offers information about school subjects only and whether students like, dislike, or are neutral toward activities in reading, math, science and social studies.[8]

Survey of School Attitudes Form A was used as a pre-survey and Form B as a post-survey to help demonstrate the effectiveness or group change over the instructional period.

CHAPTER IV

RESULTS AND ANALYSIS OF DATA

The purpose of this chapter is to objectively analyze the test data secured during this study in order to answer the question posed in Chapter I:

> Do second graders who receive formally prepared lessons for twenty minutes per day for five weeks each in science, social studies and math show any significantly greater gains in reading comprehension and language development than similar students without formally prepared lessons?

The comparative improvement of the group was measured by standardized tests of

a) picture vocabulary
b) verbal expression
c) teacher appraisal of the child's use of oral language
d) attitudes
e) reading comprehension in each content area.

As described in Chapter III, the Peabody Picture Vocabulary Test, Form A and B were used to measure the achievement of the students involved in the study. The test evaluated achievement in the area of picture vocabulary.

The Illinois Test of Psycholinguistic Abilities subtest in verbal expression was used to measure the child's ability to express ideas in spoken words. The teacher appraisal of the child's oral language in classroom situations measured frequency of utterance, relevancy of utterance, and maturity of utterance.

The Inventory-Survey Test measured the comprehension and word analysis of the child through reading.

Science, a Modern Approach Evaluation measured the child's ability to solve a scientific problem.

Evaluation Three of Mathematics Around Us measured the child's ability to evaluate comparison of numbers, order, sums and minuends through ten. An alternate form was used as a post-test.

Survey of School Attitudes Forms A and B were used to survey the child's attitude toward reading, math, science and social studies.

At the beginning of the experimental study the P.P.V.T. and I.T.P.A. were administered to the children. On the basis of these scores the children were divided into two groups. Pairs of children with approximately equal scores were placed in different groups. The following table shows the paired arrangement.

P.P.V.T. and I.T.P.A. Scores

Formal Group I	Informal Group II
16.7	17.0
16.8	16.7
16.5	16.4
15.5	15.9
15.3	15.2
14.9	15.1
14.7	14.7
14.5	14.4
11.9	13.5

A two-sample t-test for the difference of the means of these scores and a F-test for the difference of the standard deviation yielded the following information.

Formal Group I	Informal Group II
Mean=15.1	Mean=15.3
Standard Deviation= 1.6	Standard Deviation= 1.1
t-value= .420	
F-value= 1.715	

On the basis of this information it was concluded that there was no difference between the means and standard deviation of formal and informal group at a 5% level of significance. Group I received formal instruction and Group II received informal instruction during the study.

After fifteen weeks of instruction a battery of tests was administered. The change in scores on these tests was calculated. Using statistical analysis it was determined whether the average change in scores of the formal and informal groups were different. The data is summarized in the following table.

Test	Formal Group	Informal Group	t-value in the 2-sample test for difference of means	F-value in the 2-sample F test for difference of standard deviation	t-value in the paired-sample t-test	T-value in the Mann-Whitney test for equal averages
P.P.V.T. and I.T.P.A.	M = 60.11 σ = 44.22	M = 40.62 σ = 16.58	t = 1.086 *	F = 6.016 Formal>Informal	1.195 *	77 *
Reading Vocabulary	M = 25.22 σ = 8.15	M = 23.45 σ = 6.91	t = .499 *	F = 1.390 *	0.544 *	-
Frequency of Verbal Expression	M = 0.77 σ = 1.30	M = 0.44 σ = 1.13	t = 0.580 *	F = 1.326 *	0.666 *	-
Relevancy of Verbal Expression	M - 0.77	M = 0.44	t = 0.635 *	F = 7.899 Formal>Informal	0.632 *	88.5 *
Maturity of Verbal Expression	M = 1.44 σ = 1.01	M = 0.88 σ = 0.92	t = 1.212 *	F = 1.193 *	0.359 *	-
Reading Attitude Percentile Gains	M = 1.55 σ = 26.23	M =-2.66 σ = 26.47	t = 0.339 *	F = 1.018 *	0.359 *	-
Math Attitude Percentile Gains	M =-7.55 σ = 35.12	M =-25.00 σ = 35.38	t = 1.049 *	F = 1.014 *	1.281 *	-
Science Attitude Percentile Gains	M = 0.44 σ = 44.20	M =-36.22 σ = 26.96	t = 2.124 Formal>Informal	F = 2.687 *	2.755 Formal>Informal	-

* No significant difference

Test	Formal Group	Informal Group	t-value is the 2-sample test for difference of means	F-value in the 2-sample F test for difference of standard deviation	t-value in the paired-sample t-test	T-value in the Mann-Whitney test for equal averages
P.P.V.T. and I.T.P.A.	M = 60.11 σ = 44.22	M = 40.62 σ = 16.58	t = 1.086 *	F = 6.016 Formal>Informal	1.195 *	77 *
Social Studies Attitude Percentile Gain	M =-13.11 σ = 35.02	M = 26.22 σ = 35.03	t = 0.793 *	F = 1.000 *	0.949 *	-
Reading Attitude Gain	M = 0.11 σ = 0.78	M = 0.00 σ = 1.00	t = 0.262 *	F = 1.636 *	0.244 *	-
Math Attitude Gain	M = 0.00 σ = 1.32	M =-0.77 σ = 1.20	t = 1.305 *	F = 1.211 *	0.777 Formal>Informal	-
Science Attitude Gain	M = 0.00 σ = 1.41	M =-0.66 σ = 1.65	t = 0.917 *	F = 1.374 *	1.154 *	-
Para-Reading Gain	M = 25.44 σ = 13.21	M = 24.11 σ = 14.90	t = 0.200 *	F = 1.272 *	0.265	-
Reading Comp. Gain	M = 25.77 σ = 7.10	M = 25.44 σ = 7.95	t = 0.093 *	F = 1.254 *	0.169	-
Sentence Read. Gain	M = 20.33 σ = 4.94	M = 24.22 σ = 2.90	t = 2.032 Informal>Formal	F = 2.901 *	2.240 Informal>Formal	-
Social Studies Attitude Gain	M =-0.22 σ = 1.64	M =-0.33 σ = 1.22	t = 0.162 *	F = 1.796 *	0.175	

* No significant difference

The 2-sample t-test yielded a difference in the means from the Science Attitude Percentile tests, with the Formal Group scoring higher and from the Sentence Reading Gain with the Informal Group scoring higher.

Since the standard deviations were statistically different in the P.P.V.T., I.T.P.A., and the Relevancy of Verbal Expression, the Mann-Whitney test was applied yeilding again that there was no significant difference between average gain.

Since the children had been separated into two groups by placing children obtaining approximately equal scores in different groups, the paired sample t-test was applied. There was a significant difference in three tests. The Formal Group scored higher in the Science Attitude Tests and the Informal Group scored higher in Sentence Reading. Results were also obtained from the t-test for the difference of means. The paired test showed that there was also a difference in Math Attitude Gain, with the Formal Group scoring higher.

Summary

1. The means of the scores of the formal group were significantly higher in the science and math attitude tests.

2. The means of the scores of the informal group were significantly higher in the sentence reading test.

3. Though the means were the same, the standard deviations of the scores of the formal group were significantly higher in the P.P.V.T., I.T.P.A., and the relevancy of verbal expression.

Recommendations

More research using a large sample of students is needed to provide greater statistical validity. That research might also show whether one of the kinds of instruction used here is more valuable than the other, or whether entirely different instruction would be at least equally valuable.

Conclusions

The results of this study seem to indicate that both formal and informal teaching were equally successful.

As the summary concludes, only three of the sixteen areas tested proved a significant difference.

Emphasis on well planned and prepared instruction, formal or informal, seems to be the key to greater learning productivity.

TABLE 1

Gains for Formal and Informal Groups in Second Grade

Statistic Test	t-ratio
P.P.V.T. Score	1.086
I.T.P.A. Score	1.086
Reading Vocabulary	0.499
Frequency of Verbal Expression	0.580
Relevancy of Verbal Expression	0.635
Maturity of Verbal Expression	1.212
Reading Attitude Percentile	0.339
Math Attitude Percentile	1.049
Science Attitude Percentile	2.124*
Social Studies Attitude Percentile	0.793
Reading Attitude Level	0.262
Math Attitude Level	1.305
Science Attitude Level	0.917
Paragraph Reading	0.200
Sentence Reading	0.998
Reading Comprehension	0.093
Social Studies Attitude	0.999

*.05 level of significance

TABLE 2

P.P.V.T. and I.T.P.A. Gains in Years and Months for Paired Children

Formal Group	Informal Group
1.7	3.9
3.3	4.11
9.4	5.1
10.8	4.2
5.5	3.0
1.1	3.1
4.5	.9
3.6	5.1
5.0	3.4

TABLE 3

Teacher Appraisal of Verbal Expression

Frequency		Relevancy		Maturity	
Formal	Informal	Formal	Informal	Formal	Informal
-1	0	+2	+1	+2	+2
-1	-1	-1	0	+2	+1
+1	+3	0	0	0	+2
0	0	-1	+1	+2	0
+1	+1	+3	0	+3	+2
+3	0	0	0	0	+1
+1	+1	0	+1	+2	0
+2	0	+2	+1	+1	0
+1	0	+2	0	+1	0

A. Frequency of utterance
   1. Rarely
   2. Seldom
   3. Occasionally
   4. Frequently
   5. Always

B. Relevancy of utterance
   1. Irrelevant
   2. Generally irrelevant
   3. Indirectly relevant
   4. Generally relevant
   5. Relevant

C. Maturity of utterance
   1. One word
   2. Phrases
   3. Simple sentences
   4. Modified sentences
   5. Elaborated, expanded, and complete sentences

TABLE 4

Reading Vocabulary Grade Level Gain for Paired Children		Reading Comprehension Grade Level Gain for Paired Children	
Formal	Informal	Formal	Informal
2.8	1.5	2.9	1.8
2.0	3.0	1.9	2.3
1.6	1.7	1.10	2.6
1.2	1.6	2.6	1.4
3.0	1.5	2.7	1.10
1.2	1.8	.8	.10
2.6	2.4	2.9	2.7
2.4	2.1	2.0	1.7
2.7	1.9	2.3	1.9

TABLE 5

Sentence Reading Grade Level Gain for Paired Children		Paragraph Reading Grade Level Gain for Paired Children	
Formal	Informal	Formal	Informal
1.8	2.1	3.0	3.4
2.0	1.9	1.0	3.2
1.11	2.2	2.7	.9
2.1	2.6	1.0	1.0
1.9	1.11	3.0	.8
.8	2.0	.2	.6
1.9	2.1	2.9	2.6
1.8	1.8	3.0	3.2
1.9	2.0	2.11	3.0

TABLE 6

Attitudes Percentile Gain

Reading		Math		Science		Social Studies	
Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal
41	- 4	3	-27	-13	- 2	-50	- 6
-28	5	27	5	-51	-39	6	-27
-33	-14	-41	-52	-42	-60	-60	-62
15	-25	25	-33	24	-23	51	-15
-26	-16	-77	-56	-57	-70	-40	-66
17	27	22	20	63	5	18	11
28	- 4	-27	28	18	-23	-19	25
0	47	-10	-36	54	-60	-17	-43
0	-40	10	-74	8	-54	- 7	-65

TABLE 7

Attitudes Level Score Gain

Reading		Math		Science		Social Studies	
Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal
+1	-1	-1	-1	-1	0	-2	+1
-1	0	+1	0	-2	-1	+1	-1
-1	0	-2	-2	-1	-1	-2	-1
+1	-1	+1	-1	+2	0	+2	0
0	0	-1	-1	-1	-3	-2	-1
+1	+1	+2	+1	+1	+3	+2	0
0	0	0	+1	0	-1	0	+1
0	+2	-1	-2	+2	-1	0	-1
0	-1	+1	-2	0	-2	-1	-2

Level Score	Verbal Description
5	Expresses a liking for all or nearly all aspects of the curricular area.
4	Expresses a liking for most aspects of the area, but may dislike or be indifferent to some aspects of the curricular area.
3	Is indifferent to most aspects of the curricular area or expresses about an equal number of likes and dislikes.
2	Expresses a dislike for most aspects of the area, but may like or be indifferent to some aspects of the curricular area.
1	Expresses a dislike for all or nearly all aspects of the curricular area.

FOOTNOTES

[1]Ruth G. Strickland, "What Children Need to Know About Language," in New Directions in Elementary English (Champaign, Illinois: National Council of Teachers of English, 1967), p. 85.

[2]Marjorie Longstreth Oelrich, Ph.D. A Study of Observation Ability of Kindergarten Children in Science Experiences Involving Plant Specimens (Unpublished Doctor's dissertation, University of Iowa, 1969).

[3]L. Dunn, Expanded Manual for the Peabody Picture Vocabulary Test (Minneapolis, Minnesota: American Guidance Services, 1969), p. 25.

[4]S. Kirk and J. McCarthy, The Construction, Standardization and Statistical Characteristics of the Illinois Test of Psycholinguistic Abilities (Urbana, Illinois: Institute for Research on Exceptional Children, 1963), p. 1.

[5]Marion Monroe, Inventory-Survey Test (Glenview, Illinois: Scott, Foresman and Company, 1969), p. 1.

[6]Abraham S. Fischler and others, Science, a Modern Approach Evaluation (New York, New York: Holt, Rinehart and Winston, Inc., 1967), p. 1.

[7]L. Carey Bolster and others, Mathematics Around Us (Glenview, Illinois: Scott, Foresman and Company, 1975), p. 45.

[8]Thomas P. Hogan, Manual for Administering and Interpreting Survey of School Attitudes (New York, New York: Harcourt Brace Jovanovich, Inc., 1975), p. 4.

BIBLIOGRAPHY

BIBLIOGRAPHY

BOOKS

Allen, Judy and others. Cultural Awareness for Young Children Dallas, Texas: The Learning Tree, 1975.

Anderson, Ronald D., and others. Developing Children's Thinking Through Science. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970.

Arey, Charles K. Science Experiences for Elementary Schools. New York: Bureau of Publications, Teachers College, Columbia University, 1961.

Eliason, Claudia F. and Loa Thomson Jenkins. A Practical Guide to Early Childhood Curriculum. St. Louis: The C. V. Mosby Company, 1977.

Herman, Jerry J. Developing an Effective Elementary Science Curriculum. West Nyack, New York: Parker Publishing Company, Inc., 1969.

Hittleman, Daniel R. Developmental Reading: A Psycholinguistic Perspective. Chicago: Rand McNally College Publishing Company, 1978.

PERIODICALS

Guthrie, John T. "Teaching Styles and Pupil Personalities." The Reading Teacher, vol. 31, No. 4 (January, 1978), p. 468.

Karnes, M.B. et al. "Evaluation of Two Preschool Programs for Disadvantaged Children: A Traditional and Highly Structured Experimental Preschool." Exceptional Children, vol. 34 (May, 1968), 667-76.

Prendergast, R. "Pre-Reading Skills Developed in Montessori and Conventional Nursery Schoo." Elementary School Journal, vol. 70 (December, 1969), 135-41.

Stanchfield, Jo M. "The Development of Prereading Skills." The Elementary School Journal, vol. 71, no. 8 (May, 1971), 438-47.

MISCELLANEOUS

Dunn, Lloyd M. Peabody Picture Vocabulary Test Manual. Circle Pines, MN: American Guidance Service, Inc., 1959.

Erickson, Sheryl E. Conference on Studies in Reading. National Institute of Education, U. S. Dept. of Health, Education, and Welfare, 1978.

Hogan, Thomas P. Survey of School Attitudes. New York, New York: Harcourt Brace Jovanovich, Inc., 1975.

Kirk, S. and McCarthy, J. The Construction, Standardization and Statistical Characteristics of the Illinois Test of Psycho-linguistic Abilities. Urbana, Illinois: Institute for Research on Exceptional Children, 1963.

Kruse, Ramona. A Comparative Study of Prekindergarten Communication in Day Care, Nursery School and Head Start. Unpublished Specialist Degree Thesis, Mankato State University, 1973.

Oelerich, Marjorie Longstreth, Ph.D. A Study of the Observation Ability of Kindergarten Children in Science Experiences Involving Plant Specimens. Unpublished Doctor's dissertation, University of Iowa, 1969.

APPENDIX A

TEACHER'S GUIDE

FOR

EXPERIMENTAL STUDY

SCIENCE

Unit on Air

Young children soon learn that air is all around us, is real, and takes up space. Air can also be touched and felt, as we feel the blowing wind, the cold and hot temperatures of the seasons, our breath, or the air from a compressor or pump.

Objectives

I. To develop the following concepts:

1. Air is part of the earth and is all around us.
2. Air takes up space.
3. Animals, people, and plants need air for survival.
4. Fire needs air to burn.
5. Air has weight.
6. Air has force.
7. Air moves.
8. There is air in dirt.
9. There is air in water.
10. Bubbles are formed with air. If you are blowing bubbles, the air comes from inside your body.
11. Air expands when heated, and warm air rises upward.
12. Air helps many items to float on water.
13. Air has many uses.

II. To develop the following skills:

1. The ability to make accurate observations and to develop orally a step-by-step record of observations.
2. Ability to make simple generalizations from observations.
3. Ability to read charts and graphs, to meet the needs created by the unit.

4. Ability to make classifications.

III. Activities and Experiences

1. Have children hold their hands close to their mouths and noses to feel the air as it is exhaled. Also, have them put their hands on their chests to feel their chests (lungs) expand and contract as air is inhaled and exhaled.

2. Obtain a flexible cardboard box no smaller than a gelatin box and no larger than a cereal box. Cut a hole in one end and wrap the box with paper, making sure to wrap around the hole but not cover it. Above the hole, glue tiny tissue-paper streamers so that they hang across the hole. Pass the box around so that all the children can shake it or feel it. Then ask them, "What is inside the box?" Unless the children have had previous discussion on air, they will probably reply that the box is empty. When the box comes back to you, squeeze the box in the center and ask the children, "If nothing is in the box, what is making the tissue paper move?" The conclusion should be drawn that there is air in the box; when the box is squeezed, it forces some of the air out through the hole, making the tissue paper move.

3. Place a tissue in the bottom of a glass. Invert the glass in a large glass bowl that has been filled with water. Ask the children why the tissue does not get wet. If they do not know, explain that the glass is full of air and that air takes up space. When the tissue stays dry, it is because the glass is full of air and there is no room for water to enter. If the glass is tipped to the side, air bubbles will escape and water will take the place of the air, allowing the tissue to get wet.

4. Fill a glass or jar half full of dry soil or dirt. With children gathered very close around the jar, pour water onto the soil. Ask the children what they see and hear. They should be able to both see and hear air bubbles come up out of the soil. Explain that there is air in dirt, and water that is poured onto the soil and seeps down into it takes the place of the air and forces the air to the surface.

5. Fill a clear glass container with water. Allow it to stand for a brief period of time. Soon air bubbles will begin to form against the edges of the container. The air from the water has formed the air bubbles.

6. Fill a trough, tub, or sink with water. Obtain a small plastic container with a lid, such as an empty detergent bottle, empty plastic storage container, or small plastic bottle. Put the lid on, and place it in the container with water. Ask the children whether it will float or sink. Why does it float?

Explain that it floats because it is lighter in weight and also is filled with air. Take the lid off, and fill the plastic container with water. Will it still float? A similar activity can be carried out in a larger body or pool of water. Show the children a deflated inner tube. Will it float or sink? Now inflate it with air and see what happens. Air helps things to float.

7. To demonstrate that fire needs air, obtain three pie plates or saucers and put identical small candles on each one (may need to melt a little wax to hold the candle in place). Select three glass jars of varying sizes (pint, quart, and gallon work well). Light one of the candles, and then put a jar over the candle. Ask the children to observe what happens. When the candle goes out, ask the children if they know why the candle went out. Now perform the same demonstration while using the other two jars. If possible, put the jars on the candles at exactly the same time. Why does the candle under the smallest jar go out first? Why does the candle under the largest jar go out last? Explain that fire needs air to burn or that air has oxygen in it, and once the air (oxygen) in the jar is used up, the fire goes out--it cannot burn without the air (oxygen). This same experiment can be demonstrated at Halloween time with two carved jack-o'-lanterns. Put candles in both, and set the eyes and other carved features back in one. Light both candles and replace the lids. Ask why one candle stays lighted and one goes out. Explain that the jack-o'-lantern with the carved face allows air inside, but the other one is sealed up and does not allow air inside. Thus when the fire has used up all the air on the inside, the flame goes out because it needs air (oxygen) to burn.

8. Discuss what would happen if people, animals, and plants did not have air. Put a glass jar over a plant and observe what happens in a few days. Make sure the plant still has water and sunlight. The plant will die without adequate air.

9. Put a balloon on the edge of the table or a desk. Put a book on top of the balloon and then blow the balloon up. The air in the balloon will force the book up.

10. Even on a day when the weather is not windy, go outside and observe the trees and other plant life. They will be moving slightly because of moving air. Blow some bubbles and watch them float on the air. Turn on a fan or vacuum and observe as the air moves items.

11. Give the children a glass or container of water and a straw. While blowing, they will see and hear the bubbles created when the air from inside of them blows through the straw and makes the bubbles in the water. Once the children have

mastered blowing (and not sucking), add a small amount of detergent to water in a bowl, cup, or other container. Give them a straw and let them blow bubbles.

12. Make kites and pinwheels. Explain that it is both the construction of the objects and the moving air that makes them fly.

13. Blow bubbles outside and explain that air from inside the child fills the bubble, whereas the air outside makes the bubbles move--the more wind (moving air) there is, the faster and farther the bubbles will move. A good solution for bubble blowing is made from either 8 oz. liquid detergent and 1 oz. glycerin, or 8 oz. liquid detergent and ½ cup sugar. Blower wands can be made by bending and twisting coat hangers or other heavy weight wires such as pipe cleaners.

14. Related activities.

Unit on Water

Even though water is one of the substances most familiar to children, they never tire of exploring it. From experiences with children and water, it has been found that even unusual media such as salt, oats, rice, styrofoam material placed in a trough do not capture as much attention as water. Water not only seems to interest all children, but it holds and maintains their attention for longer periods of time than do many other media.

Objectives

I. To develop the following concepts:

1. Characteristics of water. (One should not attempt to investigate the components of water with young children.)

   a. A liquid

   b. Colorless, but can be colored by adding substances (food coloring, gelatin, ink, bluing)

   c. Takes the shape of the container into which it is poured

   d. Natural taste changed with addition of chemicals used in purifying

   e. Temperature changed through heating and cooling

2. There are different forms of water.

   a. Liquid (as previously explained)

   b. Ice - water in frozen form

   c. Steam - water that has changed to a gas or vapor

3. Water has many uses.

   a. Man - drinking for survival; washing and cleansing of self, clothes, home, food; watering crops, gardens and all plants in surroundings; cooking; ice for preserving, foods, and cooking foods; steam for cleaning, ironing and pressing, removing wallpaper, stamps, or other items glued to surfaces, in generators, and in steam turbines

   b. Animals - survival; habitat

   c. Plants - survival; habitat

4. There is a water cycle. Water in the air condenses into clouds and comes to the ground in various forms of weather-rain, snow, etc. It then collects in lakes, seas, ponds. From there, rivers and streams carry it to reservoirs and storage tanks. After purification it is carried through underground pipes into homes, schools, buildings, etc. Children may also be interested to learn that water collects underground, so that a well can be dug to pump the water from the ground. Children could observe the water pipes in a home under construction or in a home where the water pipes are easily viewed.

5. Many forms of recreation utilize water.

   a. Fishing

   b. Boating

   c. Swimming

   d. Water skiing

6. Water is involved in many professions.

   a. Firefighters - extinguishing fires

   b. People who fish

   c. Sailor - protecting the seas

   d. Plumbers - repairing water pipes and water systems

7. Some objects sink in water, and some objects float.

8. Some materials dissolve in water, and some do not.

9. Some items absorb water, and some do not.

II. To develop the following skills.

1. The ability to make accurate observations and to develop orally a step-by-step record of observations.

2. Ability to make simple generalizations from observations.

3. Ability to read charts and graphs, to meet the needs created by the unit.

4. Ability to make classifications.

III. Activities and Experiences

1. Observe the forms and cycles of water by first discussing ice cubes and how they are formed. Then put them in an electric frying pan with the temperature on low. Observe as the ice cubes change to water, then to steam as the water boils. Hold an aluminum pie plate above the steam to collect some of the moisture, and then observe the drops of water on the pie plate.

2. Into the classroom, bring animals that live in water--fish, tadpoles, and other aquatic life.

3. Allow the children to discover what kinds of objects float and what kinds of objects sink in water. Provide a container of water and a box of materials (paper clips, marbles, cork, sticks, beads, rocks, sponges) for experimenting with sinking and floating. The children will discover that heavier items sink, and lighter items float. However, through experimentation, they can also discover that items that sink are not always heavier than those items that float. Begin with two equal balls of oil-base clay. Ask the children if they think the clay balls will sink or float; then let them see that the clay will sink. Shape one of the balls of clay into a boat so that it will float. As an alternative, provide each child with a container of water, or have the children gathered around a trough of water. Give each of the children a ball of the oil-base clay and ask whether they can do something to it so that it will float and not sink. If oil-base clay is not available, aluminim foil can be used. Ships do not sink for the same reason that this small clay boat does sink. The boat is larger than the ball and pushes aside, or displaces, more water than the ball. The amount of water pushed aside, or displaced, by the boat weighs more than the boat itself. The water pushes the boat up until the weight of the boat and its

cargo equal the weight of the displaced water.

Put an empty, capped detergent bottle in a bowl or tub of water. It should float. Put a small amount of water in it, and it should still float. As more water is added, it sinks lower and lower, because an object will float if it is lighter in weight than the amount of water that would take up an equal amount of space. This same experience can be performed with smaller plastic bottles.

For younger children, a simpler explanation might be that some objects are too heavy to float, or some objects are not porous enough (do not have enough air in them), or some objects need to be shaped like a boat in order to float.

4. Allow children to experiment with substances that dissolve in water and substances that do not dissolve in water. Compare sand, salt, marbles, an antacid tablet, flour, tapioca, soda, sugar, gelatin, powdered drink.

5. Give children two ice cubes each. Have them sprinkle rock salt on one ice cube, and then press the ice cubes together. The children should be able to see that the salt melts the ice. Try the same experiment with small rocks and note the difference.

6. Build a terrarium and observe the rain cycle.

7. Fill a large glass or plastic container partially full of water and mark the water level. Put the container in the freezer, or outside if the temperature is below freezing. After the water freezes, determine whether the ice line is above or below the water line. The children should discover that when water freezes, it expands. Allow the container of ice to melt back into a liquid. Compare ice and water lines again.

8. Fill two clear-glass containers with water, and mark the water levels. Leave the lid on one of the containers; leave the other container uncovered. Each day observe and mark the water level in the uncovered bottle. Frequently compare the current water levels in both containers. Include the word "evaporation" often in the discussion.

9. Related activities.

SOCIAL STUDIES

Unit on Native American Culture

Young children should be exposed to the fact that there are many different cultural groups of Native Americans and that they do not all live alike. There has been a shifting about of people and the elements of culture have been exchanged. The Native American culture of the Plains, Iroquois and other Woodland tribes, as well as the tribes from the Southwest will be focused upon in the study.

Objectives

I. To develop the following concepts:

1. Family living in Native American culture.
2. Food eaten by Native Americans.
3. Shelter used by Native Americans.
4. Clothing worn by Native Americans.
5. Indian Art Expression
   a. headdress
   b. jewelry
   c. bows and arrows
   d. masks
   e. sand painting
   f. rock painting
   g. pottery
   h. murals
6. Use of nature and science by Native Americans.
7. Language development and use.
8. Uses of/for music and dance.

II. To develop the following skills:

1. The ability to make accurate observations and to develop orally a step-by-step record of observations.

2. Ability to make simple generalizations from observations.

3. Ability to read charts and graphs, to meet the needs created by the unit.

4. Ability to make classifications.

III. Activities and Experiences

1. Introduction to unit.

2. Discuss what the children already know.

3. Prepare and display the cultural environment.

4. Make bulletin boards and borders depicting the culture.

5. Have maps, globes and charts available to point out geographic locations and for charting the course of travel.

6. Learning activities through music, art, dress, dance and cooking.

Unit on Early Texas (Cowboy Culture)

The excitement of experiencing the cowboy adventures, past and present--cattle drives, roundups, branding, camping out, cooking over an open fire and riding in a rodeo--is rewarding to young children.

Many of these Cowboy activities have been modernized. However, on some of the cattle ranches in the United States, the tasks are still performed in the ways that they were in the mid-nineteenth century.

This study will extend the experiences to other Western cultures--pioneer family life will be explored.

Objectives

I. To develop the following concepts:

1. Early Texan family living.

2. Early Texan family food.

3. Early Texan family shelter.

4. Early Texan family clothing.

5. Use of nature and science by the pioneers.

6. How language and music were developed.

7. Use of games and dance in Texan culture.

II. To develop the following skills:

1. The ability to make accurate observations and to develop orally a step-by-step record of observations.

2. Ability to make simple generalizations from observations.

3. Ability to read charts and graphs, to meet the needs created by the unit.

4. Ability to make classifications.

III. Activities and Experiences

1. Introduction to unit.

2. Discuss what the children already know.

3. Prepare and display the cultural environment.

4. Make bulletin boards and borders depicting the culture.

5. Have maps, globes and charts available to point out geographic locations and for charting the course of travel.

6. Learning activities through music, art, dress, dance and cooking.

MATH

Mathematics Around Us is based on four points: motivate, teach, practice and apply. In grade two motivation comes from the activities used with the children and from the visual impact of the pages. The teaching comes during the pre-book activities and through the use of the pictures and examples in the book and in the supplementary materials. The application of a skill comes by having the children participate in games, races, and related activities.

Objectives

I. To develop the following concepts:

1. Addition and subtraction of facts in vertical form through ten.
2. Ability to match a number with the corresponding standard name.
3. Identity of names for a given number.
4. To understand that you cannot compare lengths or distances unless those involved are all using the same measuring unit.
5. Centimeter as a unit of measure.
6. To be able to tell time to the hour and to the half hour.
7. To understand a sequence of numbers in order.
8. Understanding meaning of greater than and less than.

II. To develop the following skills:

1. To add numbers vertically.
2. To subtract numbers vertically.
3. To match number names with the correct standard name.
4. To complete puzzles involving sums and minuends through ten.
5. Ability to use a centimeter ruler.
6. Ability to measure lengths to the nearest centimeter.
7. Ability to tell time to the hour and to the half hour.
8. To use greater than and less than signs to complete a number sentence.

III. Activities and Experiences

Manual for Mathematics Around Us, pages 20-41.

APPENDIX B

LESSON PLANS FOR EXPERIMENTAL STUDY

Science, A Modern Approach

1st Week Unit on Air

Monday, September 11, 1978 *V.C. 1-5. Text p. 1

An exploratory science activity: Small boxes of various kinds are wrapped as gifts. The children are told to examine and explore the boxes in any way they wish (except opening them) and try to discover what might be inside the wrapped boxes. Someone may know for sure, "Air is inside!" Discuss the fact that air is all around us, is real and takes up space.

Tuesday, September 12, 1978 V.C. 6-9. Text pp. 2-4

1. Have the children hold their hands close to their mouths and noses to feel the air as it is exhaled. Also, have them put their hands on their chests (lungs) to feel their chests expand and contract as air is inhaled and exhaled.

2. Obtain a flexible cardboard box no smaller than a gelatin box and no larger than a cereal box. Cut a hole in one end and wrap the box with paper, making sure to wrap around the hold but not cover it. Above the hole, glue tiny tissue-paper streamers so that they hang across the hole. Pass the box around so that all the children can shake it or feel it. Then ask them, "What is inside the box?" Unless the children have had previous discussion on air, they will probably reply that the box is empty. When the box comes back to you, squeeze the box in the center and ask the children, "If nothing is in the box, what is making the tissue paper move?" The conclusion should be drawn that there is air in the box; when the box is squeezed, it forces some of the air out through the hole, making the tissue paper move. (V.C. 10-11)

3. Place a tissue in the bottom of a glass. Invert the glass in a large glass bowl that has been filled with water. Ask the children why the tissue does not get wet. If they do not know, explain that the glass is full of air and that air takes up space. When the tissue stays dry, it is because the glass is full of air and there is no room for water to enter. If the glass is tipped to the side, air bubbles will escape and water will take the place of the air, allowing the tissue to get wet. (V.C. 12-16)

*V.C. - Vocabulary Cards

Wednesday, September 13, 1978 V.C. 17-25. Text pp. 5-7

1. Fill a glass or jar half full of dry soil or dirt. With children gathered very close around the jar, pour water onto the soil. Ask the children what they see and hear. They should be able to both see and hear air bubbles come up out of the soil. Explain that there is air in dirt, and water that is poured onto the soil and seeps down into it takes the place of the air and forces the air to the surface.

2. Fill a trough, tub, or sink with water. Obtain a small plastic container with a lid, such as an empty detergent bottle, empty plastic storage container, or small plastic bottle. Put the lid on, and place it in the container with water. Ask the children whether it will float or sink. Why does it float? Explain that it floats because it is lighter in weight and also is filled with air. Take the lid off, and fill the plastic container with water. Will it still float? A similar activity can be carried out in a larger body or pool of water. Show the children a deflated inner tube. Will it float or sink? Now inflate it with air and see what happens. Air helps things to float.

Thursday, September 14, 1978 V.C. 26-32. Text p. 8

1. To demonstrate that fire needs air, obtain three pie plates or saucers and put identical small candles on each one (may need to melt a little wax to hold the candle in place). Select three glass jars of varying sizes (pint, quart, and gallon work well). Light one of the candles, and then put a jar over the candle. Ask the children to observe what happens. When the candle goes out, ask the children if they know why the candle went out. Now perform the same demonstration while using the other two jars. If possible, put the jars on the candles at exactly the same time. Why does the candle under the smallest jar go out first? Why does the candle under the largest jar go out last? Explain that fire needs air to burn or that air has oxygen in it, and once the air (oxygen) in the jar is used up, the fire goes out--it cannot burn without the air (oxygen). This same experiment can be demonstrated at Halloween time with two carved jack-o'lanterns. Put candles in both, and set the eyes and other carved features back in one. Light both candles and replace the lids. Ask why one candle stays lighted and one goes out. Explain that the jack-o'lantern with the carved face allows air inside, but the other one is sealed up and does not allow air inside. Thus when the fire has used up all the air on the inside, the flame goes out because it needs air (oxygen) to burn.

2. Discuss what would happen if people, animals, and plants did not have air. Put a glass jar over a plant and observe what happens in a few days. Make sure the plant still has water and sunlight. The plant will die without adequate air.

Friday, September 15, 1978 V.C. 33-38. Text p. 9

1. Put a balloon on the edge of the table or a desk. Put a book on top of the balloon and then blow the balloon up. The air in the balloon will force the book up.

2. Even on a day when the weather is not windy, go outside and observe the trees and other plant life. They will be moving slightly because of moving air. Blow some bubbles and watch them float on the air. Turn on a fan or a vacuum and observe as the air moves items.

2nd Week Unit on Air

Monday, September 18, 1978 V.C. 39-42 Text p. 10-11

1. Give the children a glass or container of water and a straw. While blowing, they will see and hear the bubbles created when the air from inside of them blows through the straw and makes the bubbles in the water. Once the children have mastered blowing (and not sucking), add a small amount of detergent to water in a bowl, cup, or other container. Give them a straw and let them blow bubbles. Keep sponges close by to absorb water; also blow tempera paint into a design on art paper.

Tuesday, September 19, 1978 V.C. 43-44 Text p. 11

1. Make kites and pinwheels. Explain that it is both the construction of the objects and the moving air that makes them fly.

Wednesday, September 20, 1978 V.C. 45-46. Text p. 11

1. Blow bubbles outside and explain that air from inside the child fills the bubble, whereas the air outside makes the bubbles move--the more wind (moving air) there is, the faster and farther the bubbles will move. A good solution for bubble blowing is made from either 8 oz. liquid detergent and 1 oz. glycerine or 8 oz. liquid detergent and sugar. Blower wands can be made by bending and twisting coat hangers or other heavy wire such as pipe cleaner; also inflate balloons and decorate them (card or tempera). Have a pupil from a higher grade play a wind instrument for the children.

Thursday, September 21, 1978

Air has weight.

Weigh a deflated and inflated balloon; discuss difference and conclusion drawn. Put puzzles of animals, plants and machines together (discuss the need all have for air).

Friday, September 22, 1978

Review unit on air. Write an experience chart.

3rd Week Unit on Water

Monday, September 25, 1978 V.C. 47-52 Text p. 12

1. Observe the forms and cycles of water by first discussing ice cubes and how they are formed. Then put them in an electric frying pan with the temperature on low. Observe as the ice cubes change to water, then to steam as the water boils. Hold an aluminum pie plate above the steam to collect some of the moisture, and then observe the drops of water on the pie plate.

2. Into the classroom, bring animals that live in water--fish, tadpoles, and other aquatic life.

Tuesday, September 26, 1978 V.C. 53-57 Text pp. 13-14

1. Fill two clear-glass containers with water, and mark the water levels. Leave the lid on one of the containers; leave the other container uncovered. Each day observe and mark the water level in the uncovered bottle. Frequently compare the current water levels in both containers. Include the word "evaporation" often in the discussion.

Wednesday, September 27, 1978 V.C. 58-59 Text pp. 16-17

Water flows from higher to lower places. Liquids evaporate at different rates.

Thursday, September 28, 1978 V.C. 60-61 Text pp. 18-19

Objects float higher in salt water than in fresh water.

Allow children to experiment with substances that dissolve in water and substances that do not dissolve in water. Compare

sand, salt, marbles, an antacid tablet, flour, tapioca, soda, sugar, gelatin, powdered drink.

Stirring affects the time a material takes to dissolve.

Friday, September 29, 1978 Text pp. 20-21

Build a terrarium and observe the rain cycle.

Use an empty aquarium, large jar, or bowl. Put fine gravel on the bottom, then add good soil, a layer of vermiculite, some sand and a little charcoal. Add plants, then sprinkle with water. Cover. The children can observe the plants absorbing moisture, the moisture evaporating from the ground, and the moisture condensing on top of the jar.

Books - A Tree is Nice - Udry, J.
The Carrot Seed - Krauss, R.

Monday, October 2, 1978 Text p. 22

1. Give children two ice cubes each. Have them sprinkle rock salt on one ice cube, and then press the ice cubes together. The children should be able to see that the salt melts the ice. Try the same experiment with small rocks and note the difference.

2. Fill a large glass or plastic container partially full of water and mark the water level. Put the container in the freezer, or outside if the temperature is below freezing. After the water freezes, determine whether the ice line is above or below the water line. The children should discover that when water freezes, it expands. Allow the container of ice to melt back into a liquid. Compare ice and water lines again.

Water changes when it cools and freezes.

Tuesday, October 3, 1978 Text pp. 23-24

Was the "empty bottle" really empty?

How does heat or lack of heat, affect insects?

Wednesday, October 4, 1978 Text pp. 25-26

Will dependent plants grow on bread?

Do leaves on soil help keep the soil damp?

Thursday, October 5, 1978 Text p. 27

Does the amount of water in the soil affect a geranium plant?

Friday, October 6, 1978 Text p. 28

Where can bean plants grow and live?

5th Week Science Experiments Unrelated to Specific Units

Monday, October 9, 1978

Vinegar and baking soda. Into a small amount of vinegar (¼ cup), add 1 tsp. baking soda. Watch, hear, and feel what happens. (Carbon dioxide gas (bubbles) is formed when vinegar and baking soda are mixed together.)

Blowing up a balloon. Pour an inch of vinegar into a pop bottle. Put 1 or 2 tsp. of baking soda inside a balloon. Then allow the soda and vinegar to mix together. The balloon will slowly inflate.

Tuesday, October 10, 1978

Chemical garden. Combine the following ingredients: 2 Tbsp. ammonia, ¼ cup bluing, ¼ cup salt, ¼ cup water. Pour the ingredients over coal, bricks, charcoal, etc. Drops of food coloring may be added on top. In a few hours, salt crystal formations will begin to appear. Use glass containers for this experiment, since the chemicals may corrode aluminum. The chemical growth that occurs is made up of salt formations created when the liquid evaporates. The growth can be continued if more of the chemical ingredients are added or if a teaspoon or two of ammonia is added.

Wednesday, October 11, 1978

Air pressure experience. Clean an airtight metal can (a gallon gasoline can works well). Boil about 4 Tbsp. of water inside this can, and then remove the can from the stove and screw the cap on tightly. As the can cools, its sides begin to collapse inward as a result of air pressure. When the water boiled, the steam forced most of the air out of the can. As the can cooled, the steam inside of the can condensed into water and lowered the pressure inside of the can. However, it was the pressure from the air outside as the steam inside condensed that caused the sides of the can to bend inward and collapse.

Balloon and static electricity. Rub a balloon on a wool carpet, sweater, or fur until static electricity is generated. The balloon will then attract hair and small pieces of tissue paper.

Thursday, October 12, 1978

Invisible messages or pictures. Use a pen with a tip, or a toothpick. Write the message or draw the picture by dipping the pen or toothpick into vinegar or lemon juice. When the message or picture has had time to dry, it will be invisible but will reappear when the paper is held near the flame of a candle. It will show up faint brown in color--the vinegar or lemon juice combines with oxygen from the air more easily than do the untreated portions of the paper.

Friday, October 13, 1978

Overview of all experiments.

Native Americans

1st Week

Text - Adapted: Cultural Awareness for Young Children

Monday, October 16, 1978

Expose children to an environment of Native American culture in the classroom by a decor of pictures, books, objects and materials used by Native Americans.

During the first formal class the children will talk about the environment and with the teacher's guidance write convergent questions about the Native American on a chart.

Ex. Who they were? Where they lived? Food eaten?

Tuesday, October 17, 1978 V.C. 1-11. Text p. 1

A. Introduce the Native American groups to be studied:

the Plains
the Iroquois
Southwestern
Woodland tribes

B. Discuss Family living by the tribes. Text, pp. 2-4. Assign groups to make houses to represent tribes: the longhouse, the chickee, the tepee, and adobe pueblo.

Wednesday, October 18, 1978 V.C. 12-19. Text p. 5.

A. Discuss - introduce class to food eaten by Native Americans.

Make popcorn in class.

Thursday, October 19, 1978 V.C. 20-22. Text pp. 6-7.

Introduce and discuss clothing worn by Native Americans.

Create headbands, shirts and shawls worn by the Indians.

Friday, October 20, 1978 V.C. 23-45. Text pp. 8-13

Introduce and discuss Indian Art Expression through the creation of beads, bows, arrows, quivers, masks, totem poles, sand painting, pottery, murals, weapons, picture writing and rugs.

Design and paint a clay vase.

2nd Week

Monday, October 23, 1978 V.C. 46-63. Text, pp. 14-15

Introduce and discuss how the Native Americans used nature.

Introduce Indian language by using Indian symbols and interpreting them; develop a simple Indian folktale through the use of symbols.

With charcoal design Indian symbols and be able to discuss their meaning.

Tuesday, October 24, 1978 Text pp. 16-17

Teach the Navajo prayer in religion class.

Discuss the Native Americans' worship through music and dance.

Assign groups to make native instruments.

Wednesday, October 25, 1978 V.C. 64-76. Text p. 19

Introduce and discuss recreation games used by the Native Americans and put them into action.

Thursday, October 26, 1978

The children will write an experience story about the Native Americans and answer the questions they asked about the Native Americans the day they began the study of the Indian.

Friday, October 27, 1978

Celebrate the Native American study with a Native American feast, games, music, pow-wow in native costumes.

Refer to text when necessary.

*Make others aware of Indian culture by wearing head bands, shirts, etc. to the cafeteria at lunch time.

Early Texas

3rd Week

Text - Adapted: Cultural Awareness for Young Children

Monday, October 30, 1978 V.C. 1.

Expose children to an environment of Early Texas Cowboy Culture in the classroom by a decor of pictures, books, objects and materials used by Early Texans.

During the first formal class the children will talk about the environment and with the teacher's guidance write convergent questions about Cowboy Culture on a chart.

Tuesday, October 31, 1978 V.C. 2-4.

A. Introduce family living in early Texas. Text p. 1.

B. Discuss the prepared environment in which they lived. Text pp. 2-3.

Wednesday, November 1, 1978 V.C. 5-8.

A. Discuss cowboy clothing, p. 4, Text.

B. Introduct cowboy's foods and cooking experiences. V.C. 9-18. Text pp. 5-8.

Design and draw a cowboy's hat.

Using bright material make a bandana worn around the neck of a cowboy.

Thursday, November 2, 1978 V.C. 19-27. Text pp. 9-13

Discuss the cowboy's creative clothing.

Design and make a vest and belt in the style worn by the cowboy.

Friday, November 3, 1978 V.C. 28-35. Text pp. 13-16

Discuss the branding of cattle, the blacksmith, nature and science in the life of the cowboy.

Make branding symbols.

4th Week

Monday, November 6, 1978 V.C. 36-37. Text p. 17

Discuss the natural history common to cowboy culture.

Tell a "wild tale" similar to the cowboy's culture.

Tuesday, November 7, 1978 V.C. 38-42. Text pp. 18-19

Introduce the music and dance of the cowboy culture.

Sing cowboy songs common to the children.

Introduce the clog dance common to the cowboy.

Wednesday, November 8, 1978 V.C. 43-48. Text pp. 19-20.

Discuss Outdoor Activities of the cowboys and their social life.

Draw a picture of the cattle roping contests. Use a real piece of rope in your drawing.

Thursday, November 9, 1978

"End of the trail cook-out" in the park. Games.

Friday, November 10, 1978

Review life of cowboy and his culture. Text pp. 1-20.

The children will read from the text.

5th Week

Overview of Native Americans and Early Cowboys

Monday, November 13, 1978

Sand Painting:
1. Background Information
2. Using the Activity
3. Extending the Activity

Text p. 21

The Golden Book of Indian Stamps, p. 34.

Tuesday, November 14, 1978

Fry Bread - a favorite Navajo food. Children make the bread and serve it.

Text p. 21.

How did the Navajo make a living? Discuss. Children are each responsible for a Navajo food which they will bring to school to talk about.

Text p. 21.

Wednesday, November 15, 1978

Map study of Indian Reservations in the United States. Each child locates in color on his/her map the areas occupied by reservations.

Golden Book of Indian Stamps, p. 48.

Thursday, November 16, 1978 Text p. 13

Make ditty bags worn by the cowboy to carry his personal belongings. Use jean material.

Provide a strong drawstring for the top of the bag.

With crayon print a symbol of a ranch on the bag.

With an iron over newspaper press the design which has been drawn on the ditty bag.

Friday, November 17, 1978

Each child is responsible for reading a single story about the Indian or Cowboy; and answer questions others may ask.

Refer to Bibliography.

1st Week Math Around Us Level 7

Monday, November 27, 1978	Manual pp. 19-20
Pre-book activities	Providing for the higher achiever
Use of the pages	Activity 12 Action Cards
Post-book activities	Vocabulary drill
Practice page 6	
Tuesday, November 28, 1978	Manual pp. 21-22
Pre-book activities	Helping the slower achiever
Use of the pages	Individualizing p. L4, H3
Post-book activities	Providing for the higher achiever
Wednesday, November 29, 1979	Manual pp. 23-24
Pre-book activities	Practice page 9
Use of the pages	Providing for higher achiever
Post-book activities	Vocabulary drill
Activity Action Cards 12	
Thursday, November 30, 1978	Manual pp. 25-26
Pre-book activities	Practice pages 10-11
Use of the pages	Helping the lower achiever
Post-book activities	Individualizing page L5, H4
Friday, December 1, 1978	Manual pp. 27-28
Use of pages	Helping the lower achiever L6
Post-book activities	Providing for the higher achiever
Activity 2, 5, 12, 13, 14	H5

2nd Week Math Around Us Level 7

Monday, December 4, 1978	Manual pp. 29-30
Pre-book activities	Practice p. 12
Use of the pages	Helping Lower Achiever L7
Post-book activities	Providing for higher achiever H6
Activity 15	
Tuesday, December 5, 1978	Manual pp. 31-32
Pre-book activities	Activity 16
Use of the pages	Activity 17
Post-book activities	
Wednesday, December 6, 1978	Manual pp. 33-34
Pre-book activities	Practice pp. 13-14
Use of the pages	Individualizing p. L8, H7
Post-book activities	
Thursday, December 7, 1978	Manual pp. 35-36
Pre-book activities	Activity 18
Use of the pages	Vocabulary drill
Post-book activities	
Friday, December 8, 1978	Manual pp. 37-38
Pre-book activities	Post-book activities
Use of the pages	Activity 19

3rd Week Math Around Us Level 7

Monday, December 11, 1978 — Manual pp. 39-40

Pre-book activities
Use of the pages

Post-book activities
Vocabulary drill

Tuesday, December 12, 1978 — Manual pp. 41-42

Pre-book activities
Use of the pages

Post-book activities
Activities 6-11

Wednesday, December 13, 1978 — Manual pp. 43-44

Pre-book activities
Use of the pages

Post-book activities
Activities 2, 5, 12-17

Thursday, December 14, 1978 — Manual pp. 45-46

Evaluation
Pre-book activities

Use of pages
Post-book activities

Friday, December 15, 1978 — Manual pp. 47-48, L8

Pre-book activities
Use of pages
Use of grid

4th Week Math Around Us Level 8

Monday, December 18, 1978	Manual pp. 49-50
Pre-book activities	Post-book activities
Use of the pages	Vocabulary
Tuesday, December 19, 1978	Manual pp. 51-52
Pre-book activities	Activities 2, 3, 20, 21
Use of the pages	Practice p. 15
Post-book activities	Individualizing pp. L9, H8
Wednesday, December 20, 1978	Manual pp. 53-54
Pre-book activities	Puzzle
Use of the pages	Practice p. 16
Post-book activities	
Thursday, December 21, 1978	Manual pp. 55-56
Pre-book activities	Activities 12-17
Use of the pages	Helping lower achiever p. L10
	Providing for high achiever p. H9
Friday, December 22, 1978	Manual pp. 57-58
Use of the pages	Practice pp. 18-19
Post-book activities	Providing for higher achiever
Activity 22	Helping lower achiever

5th Week Math Around Us Level 8

Monday, January 1, 1979	Manual pp. 59-60
Pre-book activities	Activity 14, 24
Use of the pages	Practice p. 20
Post-book activities	Individualizing pp. L11, 12, H10
Tuesday, January 2, 1979	Manual pp. 61-62
Pre-book activities	Post-book activities
Use of the pages	Practice p. 21
Wednesday, January 3, 1979	Manual pp. 63-64
Pre-book activities	Individualizing p. L13, H11
Use of the pages	Practice p. 22
Post-book activities	
Thursday, January 4, 1979	Manual pp. 65-66
Pre-book activities	Practice pp. 23-24
Use of the pages	Individualizing L14, L15, H12
Post-book activities	
Friday, January 5, 1979	Manual pp. 67-68
Pre-book activities	Activities 14, 24
Use of the pages	Practice p. 25, 26
Post-book activities	

BIBLIOGRAPHY FOR SCIENCE

Barker, B. M. The Wonders of Science. New York: Golden Book Educational Series, 1963.

Carson, R. The Sense of Wonder. New York: Harper and Row, Pub., 1956.

Falk, N. M. Matthew Blows Bubbles. New York: McGraw-Hill Book Co., 1964.

Fischler, A. S. et al. Science, a Modern Approach. Book II. New York, New York: Holt, Rinehart and Winston, Inc., 1972.

Hagaman, A. P. What is Water? Chicago: Benefic Press, 1960.

Piltz, Albert. What is Air? Chicago: Benefic Press, 1960.

Smith, H. A. et al. Modern Science Level I. Teacher's Edition River Forest, Illinois: Laidlaw Brothers, Pub., 1972.

Udry, J. M. A Tree is Nice. New York: Harper and Row, Pub., 1956.

SELECTED BIBLIOGRAPHY

Native American Culture

I. Books

1. Abernethy, Francis Edward, ed. Observations and Reflections on Texas Folklore. Austin, Texas: The Encino Press, 1972.

2. Albaum, Charlet. Ojo De Dios: Eye of God. New York: Grossett & Dunlap, Inc., 1972.

3. Baker, Betty. Little Runner of the Longhouse. New York: Harper & Row, Publishers, Inc., 1962.

4. Baldwin, Gordon C. Games of the American Indian. New York: W. W. Norton & Company, Inc., 1969.

5. Bauer, Helen. California Indian Days. New York: Doubleday & Company, Inc., 1963.

6. Baylor, Byrd. When Clay Sings. New York: Charles Scribner's Sons, 1972.

7. Bealer, Alex W. The Picture Skin Story. New York: Holiday House, Inc., 1957.

8. Berke, Ernest. The North American Indians. New York: Doubleday & Company, Inc., 1963.

9. Bjorkland, Lorence F. The Bison: The Great American Buffalo. New York: World Publishing Company, 1970.

10. Bleeker, Sonia. Indians of the Longhouse: The Story of the Iroquois. New York: William Morrow & Company, 1950.

11. Brewster, Benjamin. The First Book of Indians. New York: Franklin Watts, Inc., 1950.

12. Brindze, Ruth. The Story of the Totem Pole. New York: Vanguard Press, Inc., 1951.

13. Ceram, C. W. The First American: A Story of North American Archaeology. New York: Harcourt Brace Jovanovich, Inc., 1971.

14. Claiborne, Robert. The First American. New York: Time-Life Books, 1973.

15. Clark, Ann Nolan. The Desert People. New York: Viking Press, 1962.

16. Clark, Ann Nolan. The Little Indian Basket Maker. Chicago: Melmont Publishers, Inc., 1957.

17. Clark, Ann Nolan. In My Mother's House. New York: Viking Press, 1941.

18. Cody, Iron Eyes. Indian Sign Talk In Pictures. Hollywood, California: Boelter Classics, 1953.

19. Crowder, Jack L. Stezanii doo Ma'll. Bernalillo, New Mexico, Jack L. Crowder, 1969.

20. D'Amato, Janet and Alex. Indian Crafts. New York: Lion Press, 1968.

21. d'Aulaire, Ingri, and Parin, Edgar. Pocahontas. Garden City, New York: Doubleday and Company, Inc., 1946.

22. Erdoes, Richard. The Sun Dance People. New York: Alfred A. Knopf, Inc., 1972.

23. Estep, Irene. Iroquois. Chicago: Melmont Publishers, Inc., 1961.

24. Estep, Irene. Seminoles. Chicago: Melmont Publishers, Inc., 1963.

25. Floethe, Louise Lee. The Indian and His Pueblo. New York: Charles Scribner's Sons, 1960.

26. Friskey, Margaret. Indian Two Feet and His Horse. New York: Scholastic Magazine, Inc., 1964.

27. Glubok, Shirley. The Art of the North American Indian. New York: Harper & Row Publishers, Inc., 1964.

28. Glubok, Shirley. The Art of the Southwest Indians. New York: Macmillan Company, 1971.

29. Gridley, Marion E. The Story of the Iroquois. New York: G. P. Putnam's Sons, 1969.

30. Hatcher, Mattie Austin. "Myths of the Tejas Indians", Texas and Southwestern Lore. Austin, Texas: Texas Folk-Lore Society, 1927.

31. Hoff, Syd. Little Chief. New York: Harper & Row, Publishers, Inc., 1961.

32. Hofsinde, Robert (Gray Wolf). Indian Arts. New York: William Morrow & Company, 1971.

33. Hofsinde, Robert (Gray Wolf). Indian Music Makers. New York: William Morrow & Company, 1967.

34. Hofsinde, Robert (Gray Wolf). Indian Games & Crafts. New York: William Morrow & Company, 1967.

35. Hofsinde, Robert (Gray Wolf). The Indians' Secret World. New York: William Morrow & Company, 1955.

36. Hofsinde, Robert (Gray Wolf). Indian Picture Writing. New York: William Morrow & Company, 1959.

37. Holling, C. The Book of Indians. New York: Platt & Munk Publishers, 1962.

38. Hunt, Ben W. "Indian Ornaments", Crafts and Hobbies. New York: Golden Press, 1962, pp. 30-52.

39. Hunt, Ben W. Golden Book of Indian Crafts and Lore. New York: Golden Press, 1954.

40. Hunt, Karii, and Carlson, Bernice Wells. "Indian Masks", Masks and Mask Makers. New York: Abingdon Press, 1961, pp. 26-33.

41. Kirk, Ruth. David, Young Chief of the Quileutes: An American Indian Today. New York: Harcourt, Brace and World, Inc., 1967.

42. Lacotawin, Rosebud Yellow Rose. An Album of American Indian. New York: Franklin Watts, Inc., 1969.

43. La Farge, Olivia. The American Indian. New York: Golden Press, 1960.

44. La Farge, Olivia. A Pictorial History of the American Indian. New York: Crown Publishers, Inc., 1956.

45. Martin, Patricia Miles. Indians: The First Americans. New York: Parents Magazine Press, 1970.

46. Martin, Patricia Miles. Navajo Pet. New York: G. P. Putnam's Sons, 1971.

47. Martini, Teri. The True Book of Indians. Chicago: Children's Press, 1954.

48. Mason, Bernard S. The Book of Indian Crafts and Costumes. New York: Ronald Press Company, 1946.

49. May, Julian. Before The Indians. New York: Holiday House, Inc., 1969. Illustrations by Symeon Shimin.

50. McGaw, Jessie Brewer. Painted Pony Runs Away. New York: Thomas Nelson & Sons, 1958.

51. McLuhan, Terry C. (comp.) Touch the Earth. New York: Promontory Press, 1971.

52. McNeer, May. The Story of the Southwest. New York: Harper & Row, Publishers, Inc., 1948.

53. Moon, Grace and Cade. One Little Indian. Chicago: Albert Whitman & Company, 1957.

54. Morris, Loverne. The American Indian As Farmer. Chicago: Melmont Publishers, Inc., 1963.

55. Parish, Peggy. Let's Be Indians. New York: Harper & Row, Publishers, Inc., 1962.

56. Payne, Elizabeth. Meet the Native American Indians. New York: Random House, 1965.

57. Perrine, MARY. Salt Boy. Boston: Houghton Mifflin Company, 1968.

58. Pine, Tillie S. The Indians Knew. New York: McGraw-Hill Book Company, Inc., 1957.

59. Rachlis, Eugene. Indians of the Plains. New York: American Heritage Publishing Company, 1960.

60. Rothe, Aline. Kalitas' People: A History of the Alabama-Coushatta Indians of Texas. Waco, Texas: Texian Press, 1963.

61. Showers, Paul. Indian Festivals. New York: Thomas Y. Crowell Company, 1969.

62. Silverberg, Robert. The Old Ones: Indians of the American Southwest. New York: New York Graphic Society, Ltd., 1965.

63. Southwest Indian Country: Arizona, New Mexico, Southern Utah and Colorado. Menlo Park, California: Lane Magazine and Book Company, 1970.

64. Stirling, Matthew. Indians of North America: A Historical Panorama. Washington, D. C., National Geographic Society, 1955.

65. Sutton, Feliz. The How and Why Wonder Book of North American Indians. New York: Wonder Books, Inc., 1965.

66. Thompson, Hildegard. Getting to Know American Indians Today. New York: Coward-McCann, Inc., 1965.

67. Thompson, Stith, ed. Round the Levee. Austin, Texas: Texas Folk-Lore Society, Number I, 1916.

68. Thompson, Stith. Tales of the North America Indians. Bloomington, Indiana: University Press, 1966.

69. Thompson, Stith. The Folktale. New York: Holt, Rinehart & Winston, 1946.

70. Thorneycroft, Edward. Thunderbird: An Indian Legend. New York: Rand McNally & Company, 1972.

71. Tomkins, William. Indian Sign Language. New York: Dover Publishers, 1969.

72. Tunis, Edwin. Indians. New York: World Publishing Company, 1959.

73. Underhill, Ruth Murray. Red Man's America: A History of Indians in the United States. Chicago: University of Chicago Press, 1953.

74. Underhill, Ruth M. The Navajos. Norman Oklahoma: University of Oklahoma Press, 1956.

SELECTED BIBLIOGRAPHY

Cowboy Culture

I. Books

1. Bailey, Bernadine. Picture Book of Texas. Chicago: Albert Whitman and Company, 1964.

2. Benet, Stephen Vincent. The Ballad of William Sycamore. Boston: Little, Brown and Company, 1972.

3. Bethell, Jean. The Clumsy Cowboy. New York: Wonder Books, 1963.

4. Bronson, Wilfrid S. Coyotes. New York: Harcourt, Brace and World, Inc., 1946.

5. Brown, Mark H., and Felton, W. R. Before Barbed Wire. New York: Bramhall House, 1956.

6. Chandler, Edna Walker. Cowboy Andy. Westminster, Maryland: Beginner Books, 1959.

7. Cheney, Janet. Wolfie. New York: Harper & Row, Publishers, Inc., 1969.

8. d'Aulaire, Ingri, and Parin, Edgar. Nils. New York: Doubleday & Company, Inc., 1948.

9. Dawson, Everett. Texas Wildlife. Dallas, Texas: Banks, Upshaw & Company, 1955.

10. Dobie, J. Frank, ed. Texas and Southwestern Lore. Austin, Texas: Texas Folk-Lore Society, Number VI, 1927.

11. Floethe, Louise Lee. The Cowboy on the Ranch. New York: Charles Scribner's Sons, 1959.

12. Folsom, Franklin. America's Ancient Treasures. New York: Rand McNally & Company, 1971.

13. Friskey, Margaret. Indian Two Feet and Wolf Cubs. Chicago: Children's Press, 1971.

14. Glubok, Shirley. The Art of the Old West. New York: Macmillan Company, 1971.

15. Grant, Bruce. The Cowboy Encyclopedia. Chicago: Rand McNally & Company, 1969.

16. Greene, Carla. Cowboys: What Do They Do? New York: Harper & Row, Publishers, Inc., 1972.

17. Havighurst, Walter. The First Book of Pioneers Northwest Territory. New York: Franklin Watts, Inc., 1959.

18. Hawkinson, John. Let Me Take You On A Trail. Chicago: Albert Whitman and Company, 1972.

19. Honig, Donald. In the Days of the Cowboy. New York: Random House, 1970.

20. Landin, Les. Cowboys Around the World. Chicago: Melmont Publishers, 1963.

21. Lenski, Lois. Cowboy Small. New York: Henry Z. Walch, Inc., 1949.

22. Malone, John Williams. An Album of the American Cowboy. New York. Franklin Watts, Inc., 1971.

23. McDowell, Bart. The American Cowboy: The Life and Legend. Washington, D. C.: National Geographic Society, 1972.'

24. Monaghan, Jay. The Book of the American West. New York: Julian Messner, Inc., 1963.

25. Munch, Theodore W., and De Vault, M. Vere. Armadillo. Austin, Texas: Steck Vaughn Co., 1958.

26. Munch, Theodore W., and De Vault, M. Vere. The Roadrunner. Austin, Texas: Steck Vaughn Co., 1958.

27. Owens, William A. Texas Folk Songs. Austin, Texas: Texas Folk-Lore Society, Number 23, 1950.

28. Parish, Peggy. Let's Be Early Settlers with Daniel Boone. New York: Harper & Row, Publishers, Inc., 1967.

29. Peck. Leigh. Pecos Bill and Lightning. Boston: Houghton Mifflin Company, 1940.

30. Rounds, Glen. The Cowboy Trade. New York: Holiday House, 1972.

31. Smith, Erwin E. Life on the Texas Range. Austin, Texas: University of Texas, 1952.

32. Ward, Don. Cowboys and Cattle Country. New York: American Heritage Publishing Company, Inc., 1961.

BIBLIOGRAPHY FOR MATH

Abisch, Roz. Do You Know What Time It Is? Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968.

Charosh, Mannis. Number Ideas Through Pictures. New York: T. Y. Crowell Co., 1974.

Freschet, Berniece. The Ants Go Marching In. New York: Charles Scribner's Sons, 1973.

Hoban, Tana. Count and See. New York: Macmillan Co., 1972.

Leaf, Munro. Arithmetic Can Be Fun. Philadelphia: J. B. Lippincott, 1949.

Lofgren, Ulf. One-Two-Three. Reading, Massachusetts: Addison-Wesley, Inc., 1974.

Steadman, Ralph. The Little Red Computer. New York: McGraw-Hill, 1969.

Whitney, David C. Let's Find Out About Addition. New York: Franklin Watts, Inc., 1966.

Wylie, Joanne. Fun With Shapes. Racine, Wisconsin: Golden Press, 1972.

Yeoman, John. Sixes and Sevens. New York: Macmillan Co., 1971.